

Docket No. : SHIGA7.045APC
Application No. : 10/568,126
Filing Date : February 14, 2006

Customer No.: 20,995

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPEAL BRIEF**

Applicant : Masuda et al.
App. No : 10/568,126
Filed : February 14, 2006
For : POSTIVIE PHOTORESIST
COMPOSITION AND RESIST
PATTERN FORMATION
Examiner : Chu, John S Y
Art Unit : 1795

CERTIFICATE OF MAILING

I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

6/3/08

(Date)

Neil S. Bartfeld, Ph.D., Reg. No. 39,901

Mail Stop Appeal Brief - Patents

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the Notice of Appeal filed **April 3, 2008**, Applicant submits this Appeal Brief.

TABLE OF CONTENTS

I.	Real Party in Interest	2
II.	Related Appeals and Interferences	2
III.	Status of Claims	2
IV.	Status of Amendments	2
V.	Summary of Claimed Subject Matter	2-3
VI.	Grounds of Rejection to be Reviewed on Appeal	4
VII.	Argument	5-9
VIII.	Claims Appendix	11-13
IX.	Evidence Appendix	13

Docket No. : SHIGA7.045APC
Application No. : 10/568,126
Filing Date : February 14, 2006

Customer No.: 20,995

X. Related Proceedings Appendix

13

I. REAL PARTY IN INTEREST

Pursuant to 37 C.F.R. §1.192, Appellants hereby notify the Board of Patent Appeals and Interferences that the real party in interest is the assignee of this application, Tokyo Ohka Kogyo Co., Ltd., 150, Nakamaruko, Nakahara-ku, Kawasaki-shi, Kanagawa-ken, Japan.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

III. STATUS OF CLAIMS

The above-identified application was filed with 7 claims. In an amendment filed October 30, 2006, claims 1 and 7 were amended, and new claims 8 and 9 were added. Claims 1-9 were finally rejected by the Examiner in a Final Office Action mailed January 25, 2007. In response to the final rejection, Applicants filed an amendment and RCE on April 24, 2007, amending claim 1 and adding new claims 10-12. A non-final Office Action was mailed on June 27, 2007 rejecting claims 1-12. In an amendment filed September 26, 2007, claims 1-12 were canceled, and new claims 13-21 were added. Claims 13-21 were finally rejected by the Examiner in a Final Office Action mailed December 5, 2007. A response to the final Office Action was filed on March 3, 2008, in which no claim amendments were made. An Advisory Action was mailed on March 25, 2008, stating that the request for reconsideration had been considered but did not place the application in condition for allowance. A Notice of Appeal was filed on April 3, 2008. Claims 13-21 are currently pending and are the subject of the Appeal Brief.

IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the amendment filed September 26, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 13 is the sole independent claim in this appeal. The subject matter of this claim relates to a positive photoresist composition formed by dissolving a photosensitive novolak resin comprising an alkali soluble novolak resin in which 3 to 7 mol% of hydrogen atoms within those

Docket No. : SHIGA7.045APC
Application No. : 10/568,126
Filing Date : February 14, 2006

Customer No.: 20,995

in all phenolic hydroxyl groups of the alkali soluble novolak resin are substituted with 1,2-naphthoquinone diazide sulfonyl groups, wherein the alkali soluble novolak resin before substitution by these groups has been fractionated by weight to produce a degree of dispersion of 2.2 to 2.8 in an organic solvent comprising 70 to 90% by weight of a propylene glycol ether acetate and ethyl lactate. Applicants' invention is based, in part, on their unexpected discovery that the use of a mixed solvent of propylene glycol ether acetate and ethyl lactate in the amount recited in present claim 1 increases the development velocity of the resist composition, while maintaining good sensitivity and perpendicularity of the resulting resist pattern.

Each limitation of the independent claim, is supported by the Specification as filed as follows:

CLAIM NUMBER	LIMITATION	SUPPORT
13	A positive photoresist composition formed by dissolving (A) photosensitive novolak resin comprising an alkali soluble novolak resin wherein 3 to 7 mol% of hydrogen atoms within those of all phenolic hydroxyl groups of the alkali soluble novolak resin are substituted by 1,2-naphthoquinone diazide sulfonyl groups	Page 3, lines 20-23; page 8, lines 21-25
	wherein the alkali soluble novolak resin before substitution by 1,2-naphthoquinone diazide sulfonyl groups has been fractionated by weight to produce a degree of dispersion of 2.2 to 2.8	Page 6, lines 17-19; page 8, lines 12-13.
	an organic solvent comprising 70 to 90% by weight of a propylene glycol alkyl ether acetate, and ethyl lactate	Page 9, lines 18 to page 10, line 2.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Examiner has rejected Claims 13-21 under 35 U.S.C. §103(a) as being unpatentable over:

(1) Bassett et al. (US 5,145,763) in view of Mizuta et al. (US 6,869,742), further in view of Lee et al. (US 2003/0165570), with the combination of Komano (US 4,847,178), Nishio et al. (US 6,101,816) and Misumi et al. (US 2003/0059706).

(2) Okazaki et al. (US 5,422,221) in view of Nishi et al. (5,759,736), Mizuta et al. (US 6,869,742), further in view of Lee et al. (US2003/165570), with the combination of Komano (US 4,847,178), Nishio et al. (US 6,101,816) and Misumi et al. (US 2003/0059706).

(3) Mizuta et al. further in view of Lee et al. (US2003/0165570).

VII. ARGUMENTS

Bassett et al. (US 5,145,763) in view of Mizuta et al. (US 6,869,742), further in view of Lee et al. (US 2003/0165570), with the combination of Komano (US 4,847,178), Nishio et al. (US 6,101,816) and Misumi et al. (US 2003/0059706)

In the Office Action mailed December 5, 2007, the Examiner alleges that it would have been *prima facie* obvious to: (1) substitute the novolak resin in Mizuta et al. as the photosensitive resin in Bassett et al. and reasonably expect same or similar results as disclosed in Bassett et al. (high resolution, sensitivity and definition); (2) have a reaction percentage of about 3.8% of the hydrogen atoms on the novolak resin for the photoresist composition as recited in Mizuta and expect same or similar results as disclosed in Mizuta et al; (3) add a known plasticizer such as acrylate polymers into the composition and reasonably expect excellent coating properties, flexibility and anti-abrasion properties to the photoresist composition; and (4) use a solvent mixture as recited in Lee et al. in which the ratio of propylene glycol methyl ether acetate (PGMEA) to ethyl lactate (EL) is 9:1 to 7:3 and reasonably expect same or similar results as recited in Lee et al. for forming a photoresist composition which is uniform in layer thickness and critical in dimensions.

Docket No. : SHIGA7.045APC
Application No. : 10/568,126
Filing Date : February 14, 2006

Customer No.: 20,995

However, the Examiner has failed to take into account MPEP 2141.02, which states that “in determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *Schenck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983). As set forth in part III of MPEP 2141.02, discovering the source or cause of a problem is part of this “as a whole” inquiry. In the present case, the Applicants have addressed the problem that a positive photoresist composition comprising a photosensitive novolak resin formed from an alkali-soluble novolak resin has slow development velocity. Applicant’s unexpectedly discovered that the source of the problem lies in the selection of solvent. This discovery must be considered in evaluating the patentability of the claimed invention. Thus, combining all the references together in the manner suggested by the Examiner would still not lead one of ordinary skill in the art to the invention as whole, which includes the discovery of the source of the problem.

The Examiner alleges that “it would have been *prima facie* obvious to the skilled artisan to use a solvent mixture as recited in Lee et al. wherein the ratio of PGMEA to ethyl lactate (EL) is 9:1 to 7:3 and reasonably expect same or similar results as recited in Lee et al. for forming a photoresist composition which is uniform in layer thickness and critical in dimension”. However, Lee teaches nothing regarding the source of slow development of the recited novolak resins. Lee only teaches that the organic solvent does not react with the photosensitive compound and the novolak resin, and should have a sufficient dissolving power and an appropriate drying rate to form uniform and flat coating layer after evaporation thereof (see Lee, paragraph [0041]). Lee also teaches that when the sensitivity enhancing agent increases the solubility of the exposed portion during developing, the sensitivity restraining agent decreases the solubility of the non-exposed portion during the developing, thereby satisfying the physical properties of increasing the sensitivity and residual layer characteristic at the same time (see Lee, paragraph [0039]). Thus, Lee teaches only that the use of a sensitivity enhancing agent and a sensitivity restraining agent enables formation of a photoresist composition which is uniform in layer thickness and critical in dimension, and provides no disclosure that would lead one of

ordinary skill in the art to Applicants' discovery of the source of the problem of slow development.

None of Bassett, Komano, Nishio or Misumi teaches or suggests a mixed solvent of propylene glycol alkyl ether acetate and ethyl lactate for dissolving the resin component. Thus, these references could not possibly provide any suggestion of the missing elements from Lee.

Although Mizuta teaches a combination of propylene glycol alkyl ether acetate with ethyl lactate as the organic solvent, Mizuta neither teaches nor suggests the specific combination of 70 to 90% by weight of a propylene glycol alkyl ether acetate with ethyl lactate. In fact, Mizuta exemplifies ethyl lactate as a preferred solvent, but not propylene glycol alkyl ether acetate (see Mizuta, column 8, lines 63 to 67). Further, in all working examples of Mizuta, a mixed solvent of ethyl lactate and butyl acetate (mixing ratio of 9:1) is used. Therefore, from the teachings of Mizuta, a skilled person in the art would not have arrived at the specific organic solvent (B) used in the present invention which contains a propylene glycol alkyl ether acetate in an amount of 70 to 90% by weight, with an expectation of decreasing the development velocity as well as obtaining high heat resistance.

Therefore, nothing in any of Bassett, Komano, Nishio, Misumi or Mizuta teach any solution to the problem of slow development, much less the particular solution arrived at by applicants of a mixed solvent of PGMEA and EL in a weight ratio of 9:1 to 7:3. Accordingly, there is no reason for one of ordinary skill in the art to produce the claimed invention as a whole. Rather, the only use of a mixed solvent of PGMEA and EL in a weight ratio of 9:1 to 7:3 would be to achieve the effects taught in Lee of uniform in layer thickness and critical in dimension. In view of the teachings of paragraph [0039] of Lee, one of ordinary skill in the art would only use a sensitivity enhancing agent and a sensitivity restraining agent to achieve these effects.

The present claims recite, as the resin component, a photosensitive novolak resin (A) comprising an alkali soluble novolak resin wherein 3 to 7 mol% of hydrogen atoms within those of all phenolic hydroxyl groups of the alkali soluble novolak resin are substituted by 1,2-naphthoquinone diazide sulfonyl groups. In contrast, Lee teaches a novolak resin which has not been substituted with 1,2-naphthoquinone diazide sulfonyl groups as the resin component, and a naphthoquinone diazide that is separately used as a photosensitizer component. As described

Docket No. : SHIGA7.045APC
Application No. : 10/568,126
Filing Date : February 14, 2006

Customer No.: 20,995

above, by using a mixed solvent of 70 to 90% by weight of a propylene glycol alkyl ether acetate, and ethyl lactate in combination with the photosensitive novolak resin (A) recited in Claim 1, not only can the development velocity of the resist composition be increased while maintaining the effect by the component (A) (good sensitivity and perpendicularity of resist pattern formed), but also the heat resistance of the resist composition can be improved. Since Lee uses a completely different resin component, it is apparent that Lee does not recognize the above-described beneficial effects.

Okazaki et al. (US 5,422,221) in view of Nishi et al. (5,759,736), Mizuta et al. (US 6,869,742), further in view of Lee et al. (US2003/165570), with the combination of Komano (US 4,847,178), Nishio et al. (US 6,101,816) and Misumi et al. (US 2003/0059706)

The Examiner alleges that it would have been *prima facie* obvious to: (1) use a mixture of ethyl lactate and polypropylene glycol monomethyl ether acetate to dissolve the components of Okazaki et al. and reasonably expect same or similar results with respect to smooth coating properties and excellent storage stability; (2) to substitute the novolak resin in Mizuta et al. as the photosensitive resin in Bassett et al. and reasonably expect same or similar results as disclosed in Bassett et al. (high resolution, sensitivity and definition) and have a reaction percentage of about 3.8% of the hydrogen atoms on the novolak resin for the photoresist composition as recited in Mizuta and expect same or similar results as disclosed in Mizuta et al; (3) add a known plasticizer such as acrylate polymers into the composition and reasonably expect excellent coating properties, flexibility and anti-abrasion properties to the photoresist composition; and (4) use a solvent mixture as recited in Lee et al. in which the ratio of PGMEA to ethyl lactate (EL) is 9:1 to 7:3 and reasonably expect same or similar results as recited in Lee et al. for forming a photoresist composition which is uniform in layer thickness and critical in dimensions.

As described above, Lee only teaches that the organic solvent does not react with the photosensitive compound and the novolak resin, and should have a sufficient dissolving power and an appropriate drying rate to form uniform and flat coating layer after evaporation thereof (see Lee, paragraph [0041]). Lee also teaches that the use of a sensitivity enhancing agent and a

sensitivity restraining agent enables formation of a photoresist composition which is uniform in layer thickness and critical in dimension (see Lee, paragraph [0039]). Lee does not teach or suggest anything that would lead one of ordinary skill in the art to the claimed invention as a whole, which includes the discovery of the source of the problem of slow development.

None of Okazaki, Komano, Nishio or Misumi teach or suggest a mixed solvent of a propylene glycol alkyl ether acetate with ethyl lactate for dissolving the resin component. In addition, Mizuta neither teaches nor suggests the specific combination of 70 to 90% by weight of a propylene glycol alkyl ether acetate with ethyl lactate as the organic solvent. In fact, Mizuta exemplifies ethyl lactate as a preferred solvent, but not propylene glycol alkyl ether acetate (see Mizuta, column 8, lines 63 to 67). Further, in all working examples of Mizuta, a mixed solvent of ethyl lactate and butyl acetate (mixing ratio of 9:1) is used. Such a solvent would not solve the problem of slow development. Moreover, based on the teachings of Mizuta, one of ordinary skill in the art would not have arrived at the specific organic solvent (B) used in the present invention which contains a propylene glycol alkyl ether acetate in an amount as large as 70 to 90% by weight, with an expectation of decreasing the development velocity as well as obtaining high heat resistance. Furthermore, Nishi neither teaches nor suggests the specific combination of 70 to 90% by weight of a propylene glycol alkyl ether acetate with ethyl lactate as the organic solvent. In fact, the mixed solvent used in the working examples of Nishi contains 21 g of ethyl lactate and 9 g of propylene glycol monoethyl ether acetate. That is, the amount of propylene glycol monoethyl ether acetate contained in the mixed solvent used in Nishi is $9 \text{ g} / (21 \text{ g} + 9 \text{ g}) \times 100\% = 30\%$, which is outside the range recited in present Claim 13 (70 to 90 %). Therefore, base on Nishi, one of ordinary skill in the art would not have arrived at the specific organic solvent (B) used in the present invention which contains a propylene glycol alkyl ether acetate in an amount as large as 70 to 90% by weight, with an expectation of decreasing the development velocity as well as obtaining high heat resistance.

Therefore, in view of Okazaki, Komano, Nishio, Misumi, Mizuta and Nishi teaching away from a mixed solvent of PGMEA and EL in a weight ratio of 9:1 to 7:3, there is no reason for a skilled person in the art to create the claimed invention as a whole, in which a mixed

Docket No. : SHIGA7.045APC
Application No. : 10/568,126
Filing Date : February 14, 2006

Customer No.: 20,995

solvent of PGMEA and EL in a weight ratio of 9:1 to 7:3 is used in order to overcome the problem of slow development. Rather, in view of the teachings of paragraph [0039] of Lee, a skilled person would use a sensitivity enhancing agent and a sensitivity restraining agent only for achieving the effects taught in Lee.

In addition, as described above, since Lee uses a completely different resin component, it is apparent that Lee does not recognize the effects of the present invention (i.e., not only can the development velocity of the resist composition be increased while maintaining the effect by the component (A) (good sensitivity and perpendicularity of resist pattern formed), but also that the heat resistance of the resist composition can be improved).

Mizuta et al. further in view of Lee et al. (US2003/0165570)

The Examiner alleges that it would have been prima facie obvious to: (1) use a mixture of ethyl lactate and polypropylene glycol monomethyl ether acetate alone to dissolve the components such as the novolak resin having a degree of dispersion of 2.2 to 2.8 as well as have about 3.8% of the hydrogen atoms on the novolak resin substituted with a naphthoquinonediazide sulfonyl group and expect same or similar results such as disclosed in Mizuta et al. for high resolution, sensitivity and definition; (2) add a known plasticizer such as acrylate polymers into the composition and reasonably expect excellent coating properties, flexibility and anti-abrasion properties to the photoresist composition; and (3) use a solvent mixture as recited in Lee et al. in which the ratio of PGMEA to ethyl lactate (EL) is 9:1 to 7:3 and reasonably expect same or similar results as recited in Lee et al. for forming a photoresist composition which is uniform in layer thickness and critical in dimensions .

As described above, Lee only teaches that the organic solvent does not react with the photosensitive compound and the novolak resin, and should have a sufficient dissolving power and an appropriate drying rate to form uniform and flat coating layer after evaporation thereof (see Lee, paragraph [0041]). Lee also teaches that the use of a sensitivity enhancing agent and a sensitivity restraining agent enables formation of a photoresist composition which is uniform in layer thickness and critical in dimension (see Lee, paragraph [0039]). Thus, Lee does not

Docket No. : SHIGA7.045APC
Application No. : 10/568,126
Filing Date : February 14, 2006

Customer No.: 20,995

provide the necessary teaching to lead one of ordinary skill in the art to the invention as a whole, which requires the solution to the problem of slow development.

In addition, Mizuta neither teaches nor suggests the specific combination of 70 to 90% by weight of a propylene glycol alkyl ether acetate with ethyl lactate as the organic solvent. In fact, Mizuta exemplifies ethyl lactate as a preferred solvent, but not propylene glycol alkyl ether acetate (see Mizuta, column 8, lines 63 to 67). Further, in all working examples of Mizuta, a mixed solvent of ethyl lactate and butyl acetate (mixing ratio of 9:1) is used. Therefore, based on the teachings of Mizuta, one of ordinary skill in the art would not have arrived at the specific organic solvent (B) used in the present invention which contains a propylene glycol alkyl ether acetate in an amount as large as 70 to 90% by weight, with an expectation of decreasing the development velocity as well as obtaining high heat resistance.

In view Mizuta's failure to teach a mixed solvent of PGMEA and EL in a weight ratio of 9:1 to 7:3, there is no reason for a skilled person in the art to use a mixed solvent of PGMEA and EL in a weight ratio of 9:1 to 7:3 in order to achieve any effects other than those taught in Lee (uniform in layer thickness and critical in dimension). Rather, in view of the teachings of paragraph [0039] of Lee, a skilled person would use a sensitivity enhancing agent and a sensitivity restraining agent with a reasonable expectation of achieving the effects taught in Lee.

In addition, as described above, since Lee uses a completely different resin component, it is apparent that Lee does not recognize the effects of the present invention (i.e., not only can the development velocity of the resist composition be increased while maintaining the effect by the component (A) (good sensitivity and perpendicularity of resist pattern formed), but also that the heat resistance of the resist composition can be improved).

Unexpected results

The significant unexpected results achieved by the presently claimed invention could not have been predicted based on any of the references cited in these rejections. These unexpected results strongly support the nonobviousness of the pending claims, and would rebut any *prima facie* showing of obviousness that might be established based on the various combinations of references.

Positive photoresist compositions comprising a photosensitive novolak resin formed from an alkali-soluble novolak resin wherein some hydrogen atoms within those of all phenolic hydroxyl groups of the alkali-soluble novolak resin are substituted by 1,2-naphthoquinone diazide sulfonyl groups have slow development velocities. The claimed photoresist composition is advantageous in that not only can it solve this problem, but additional benefits may also be obtained. Specifically, by using a mixed solvent of 70 to 90% by weight of a propylene glycol alkyl ether acetate, and ethyl lactate, not only can the development velocity of the resist composition be increased while maintaining the effect of the component (A) (good sensitivity and perpendicularity of resist pattern formed), but the heat resistance of the resist composition can also be improved (see present specification at page 9, lines 5-10 and page 10, lines 2-4). This is also demonstrated by Example 2 of the specification (see page 29, Table 1 and lines 8-11).

Applicants have previously noted that a positive photoresist composition comprising a photosensitive novolak resin formed from an alkali-soluble novolak resin in which some hydrogen atoms in the phenolic hydroxyl groups have been substituted by 1,2-naphthoquinone diazide sulfonyl groups is suitable for obtaining good perpendicularity and high sensitivity of a resist pattern in a thick film. However, in general, such a composition has slow development velocity. The present inventors have unexpectedly discovered that this problem can be addressed by using a mixed solvent of a propylene glycol alkyl ether acetate and ethyl lactate. In particular, if the amount of propylene glycol alkyl ether acetate is 70 to 90% by weight, the development velocity of the resist composition is increased while maintaining good sensitivity and perpendicularity of resist pattern formed.

Moreover, the inventors have identified additional completely unexpected results that are obtained from the use of the recited composition. That is, the heat resistance of the resist composition is also improved. See present specification at page 9, lines 5-10 and page 10, lines 2-4. This effect is clearly demonstrated in Example 2 of the specification at page 29, Table 1 and lines 8-11.

None of the cited references disclose anything that would lead one of ordinary skill in the art to expect either the unexpectedly high heat resistance or the unexpectedly enhanced

Docket No. : SHIGA7.045APC
Application No. : 10/568,126
Filing Date : February 14, 2006

Customer No.: 20,995

development velocity while maintaining good sensitivity and perpendicularity. Although Lee uses a solvent mixture similar to that claimed, Lee makes no mention of the foregoing effects. Furthermore, since Lee uses a completely different resin component, it is apparent that Lee does not recognize the unexpected, beneficial effects described above. Therefore the unexpected effects discovered by applicants could not have been predicted based on Lee, or any of the other references either alone or in combination.

In the Advisory Action mailed March 25, 2008, the Examiner contends that "Example 1 uses PGMEA alone and gives substantially the same results as Example 2 wherein a composition uses a solvent mixture of PGMEA and ethyl lactate." However, Table 1 at page 29 shows that heat resistance improved when PGMEA was combined with ethyl lactate (rating = A) compared to PGMEA alone (rating = B). Thus, the combination of PGMEA and EL provides a significant, unexpected result.

In view of the foregoing, even if it were *prima facie* obvious to incorporate pieces of the various cited references to create the presently claimed invention (which it is not), the presently claimed invention provides at least two significant unexpected results, namely increasing the development velocity and obtaining high heat resistance. These unexpected results would effectively rebut any allegation of *prima facie* obviousness. As such, withdrawal of all of the rejections under 35 U.S.C. §103(a) is respectfully requested.

Docket No. : SHIGA7.045APC
Application No. : 10/568,126
Filing Date : February 14, 2006

Customer No.: 20,995

Conclusion

In view of the arguments presented above, Appellant submits that the present claims are not rendered obvious by any of the cited combinations of references, and respectfully request that the rejections be overturned.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP.



Neil S. Bartfeld, Ph.D.
Registration No. 39,901
Agent of Record
Customer No. 20,995
(619) 235-8550

VIII. CLAIMS APPENDIX

13. (Previously presented) A positive photoresist composition formed by dissolving (A) photosensitive novolak resin comprising an alkali soluble novolak resin wherein 3 to 7 mol% of hydrogen atoms within those of all phenolic hydroxyl groups of the alkali soluble novolak resin are substituted by 1,2-naphthoquinone diazide sulfonyl groups, wherein the alkali soluble novolak resin before substitution by 1,2-naphthoquinone diazide sulfonyl groups has been fractionated by weight to produce a degree of dispersion of 2.2 to 2.8, in (B) an organic solvent comprising 70 to 90% by weight of a propylene glycol alkyl ether acetate, and ethyl lactate.

14. (Previously presented) The positive photoresist composition according to claim 13, wherein the alkali soluble novolak resin before substitution by 1,2-naphthoquinone diazide sulfonyl groups has the following characteristics (1) and (2):

- (1) a polystyrene equivalent weight average molecular weight of 1000 to 30000, and
- (2) a rate of solution to a 2.38 % by weight TMAH (tetra-methyl ammonium hydroxide) aqueous solution at 23°C is 10 to 1000Å/s.

15. (Previously presented) The positive photoresist composition according to claim 13, wherein the propylene glycol alkyl ether acetate is propylene glycol methyl ether acetate.

16. (Previously presented) The photoresist composition according to Claim 13, wherein 3 to 5 mol% of hydrogen atoms within those of all phenolic hydroxyl groups of the alkali soluble novolak resin are substituted by 1,2-naphthoquinone diazide sulfonyl groups.

17. (Previously presented) The photoresist composition according to Claim 13, which further comprises (C) an alkali soluble acrylate resin.

18. (Previously presented) The positive photoresist composition according to claim 17, wherein the alkali soluble acrylate resin (C) comprises 30 to 90% by weight of a constitutional

Docket No. : SHIGA7.045APC

Customer No.: 20,995

Application No. : 10/568,126

Filing Date : February 14, 2006

unit derived from a polymerizable compound which has an ether linkage and 50 to 2% by weight of a constitutional unit derived from a polymerizable compound which has a carboxyl group.

19. (Previously presented) The positive photoresist composition according to claim 17, wherein the molecular weight of the alkali soluble acrylate resin (C) is 10,000 to 800,000.

20. (Previously presented) The positive photoresist composition according to claim 17, wherein the amount of the alkali soluble acrylate resin (C) is more than 3 to 20% by weight, based on the photosensitive novolak resin (A).

21. (Previously presented) A resist pattern formation method comprising: coating a positive photoresist composition according any one of Claims 13 to 20 on a substrate; prebaking the coated film; selectively exposing the film; and subsequently alkali developing the film.

Docket No. : SHIGA7.045APC

Customer No.: 20,995

Application No. : 10/568,126

Filing Date : February 14, 2006

IX. Evidence Appendix

Not applicable.

Docket No. : SHIGA7.045APC

Customer No.: 20,995

Application No. : 10/568,126

Filing Date : February 14, 2006

X. Related Proceedings Appendix

There are no related proceedings.

5132830
040908